

The Impact Factor of Open Access journals: data and trends

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Impact Factor and Open Access

Aim:

to test the performance
of **Open Access journals**
with the most traditional
bibliometric indicator,
Impact Factor

Impact Factor and Open Access

Hypothesis to verify:

unrestricted access

might turn into **more citations**

and therefore also

good Impact Factor values

Caveat...

«that OA would produce
an automatic citation boost
for every article
was never the expectation»



One step beyond...

«Impact»
in scientific communication:
what is it?

The background is a solid dark blue color. At the top, there are several wavy, horizontal lines in lighter shades of blue and teal, creating a layered, water-like effect.

Impact...

... It's hard to define and
moreover harder to measure...

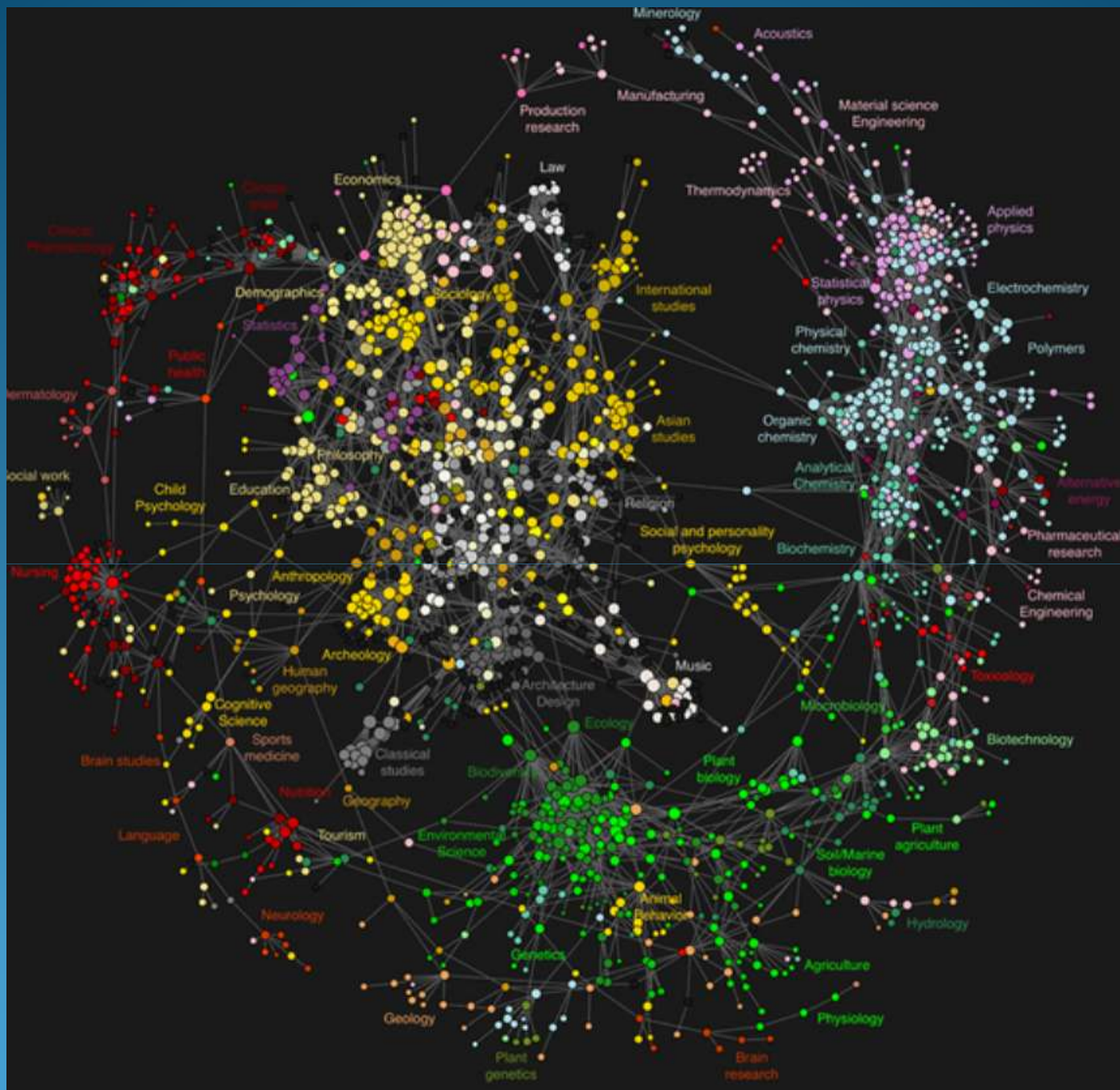
A suggestion...

«Science is a **gift-based** economy;
value is defined as the degree to
which **one's ideas** have
contributed to knowledge and
impacted the thinking of others»

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So...

...what do we mean by
«Science»?



Bollen J, Van de Sompel H et al. [Clickstream Data Yields High-Resolution Maps of Science](#). PLoS ONE 2009 4(3): e4803



Citation count...

**...is only one of the possible
impact indicators...**

[and it refers only to scholars
who publish and cite,
not to the practitioners who simply read]

Impact Factor...

...is **only one** of the **possible**
citation count
quantitative methods



In the digital era...

... a great variety
of **new impact measures**
based on social network analysis
and usage log data
are possible

A practical application...

“Article level metrics”

at PLoS ONE considers

- ✓ article usage statistics
- ✓ citations from the scholarly literature
 - ✓ social bookmarks
- ✓ comments, Notes, Blog posts, Ratings



Usage...

«Usage metrics»
seems to better describe
in their connections
and correlations
the complexity of “impact”

Prestige

Usage metrics

Popularity

Impact factor → 5

Citation metrics

So...why Impact Factor?

“Impact”
has traditionally been expressed
in terms
of quantitative indicators ...

Indicators...

...among which
Impact Factor
is a standard *de facto*

[with a privileged position in the research evaluation system]

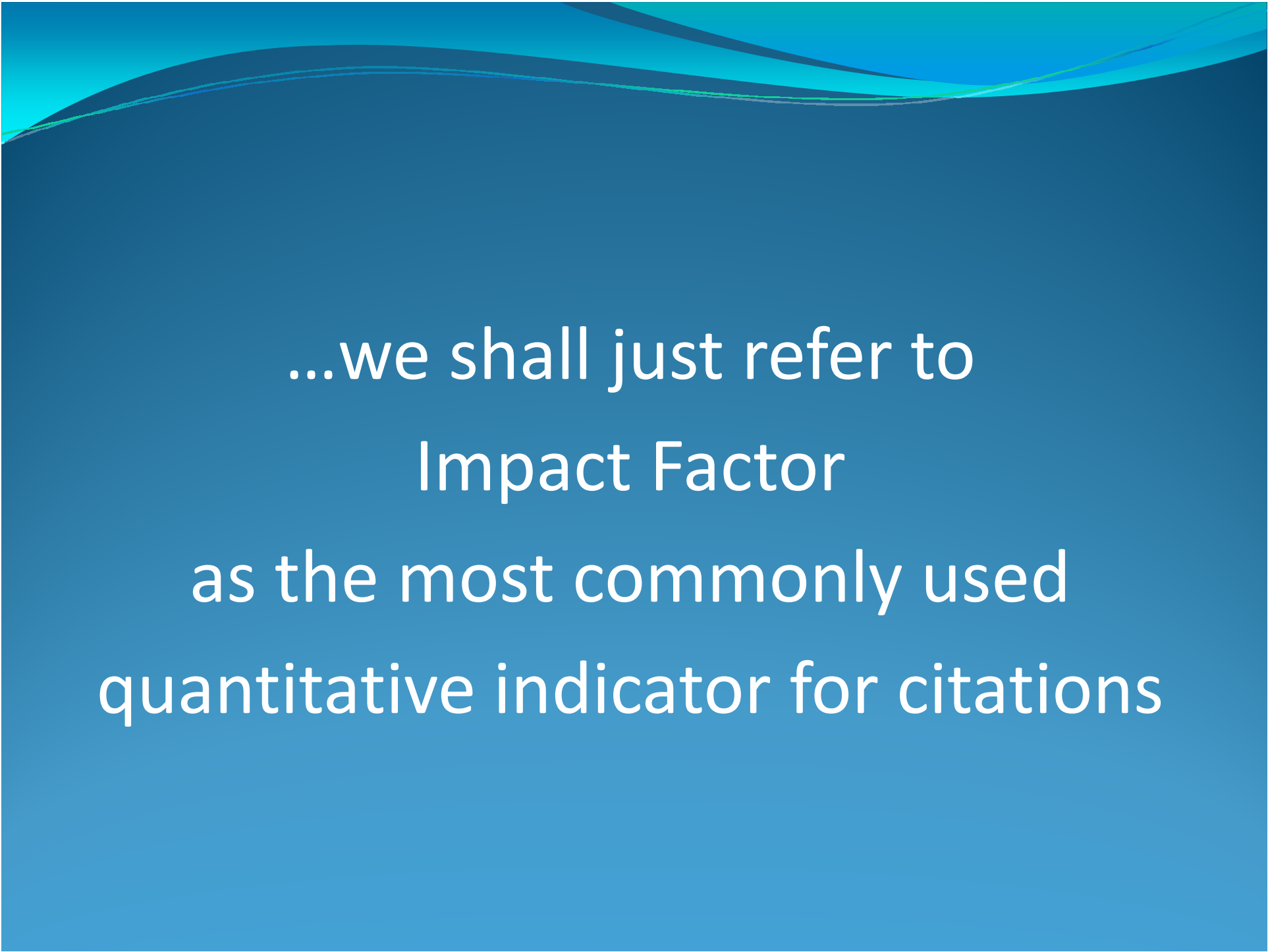
Even though...

Impact Factor is not free from
reasonable criticisms and
reservations,
widely discussed
by different actors
involved in scientific publishing



But...

...we shall not address
the debate
on the value/limits of
Impact Factor in itself

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...we shall just refer to
Impact Factor
as the most commonly used
quantitative indicator for citations

...and match it with
«one of the most
exciting and radical events
in publishing in
recent years»
i.e. Open Access

The past...

Impact Factor
has only been tested
on Open Access journals
once, in 2004

MC VEIGH ME.

Open Access journals in the ISI citation databases: analysis of
Impact Factors and citation patterns



But...

...no direct comparison with
McVeigh is possible due to
different datasets

...although we tried to maintain some
criteria in setting the method

The present...

one of the most
debated arguments
about Open Access
is its alleged
citation advantage

Citation advantage?

many studies have been carried
out to determine
if there is an actual
Open Access advantage in citations
...to what extent? Which causes?



But...

different selected datasets,
different control-cases,
different measures,
different time-spans
led to **different** and
somehow contradictory results



...depending on

the considered disciplinary field,
the researchers' attitude,
the citational behaviour,
the applied methodology



That's why...

...we shall use
Impact Factor
as a **recognized standard**,
in order to have
comparable results

Sources

- «Journal Citation Reports» (JCR),

published by Thomson Reuters (former ISI) every year in June, for the data about Impact Factor, Immediacy Index and 5-year Impact Factor.

It has a *Science* and a *Social Sciences* edition.

No coverage is provided for Humanities.

- **Directory of Open Access Journals (DOAJ),**

edited by Lund University, as the most accredited list of Open Access journals

Data

All data refers to JCR 2008
(published in June, 2009),
i.e. citations obtained in 2008 to
2007 and 2006 articles

[a preliminary study was conducted on JCR2007
to set a starting benchmark;
a further study is going to be conducted on JCR 2010]

First step:

**Fixing the list
of Open Access journals
included in
Journal Citation Reports.
There is no filter in JCR, so:
comparison!**

Impact Factor is...

«the average number of times articles from the journal published in the past two years have been cited in the JCR year »

and it is calculated

«by dividing the number of citations in the JCR year by the total number of articles published in the two previous years»

Method:

comparison of the titles present in
DOAJ as of December, 31st of the
corresponding JCR year,
and **JCR Science/Social Sciences**

[automatic query by ISSN then manual comparison]

Coverage in JCR [Social Sciences]

Year	Titles in JCR	Titles in DOAJ 31-12	OA titles with IF	OA titles with IF (%)
2003	1714	602	18	1.05%
2004	1712	1194	19	1.11%
2005	1747	1811	22	1.26%
2006	1768	2357	24	1.36%
2007	1866	2954	32	1.71%
2008	1980	3801	30	1.52%

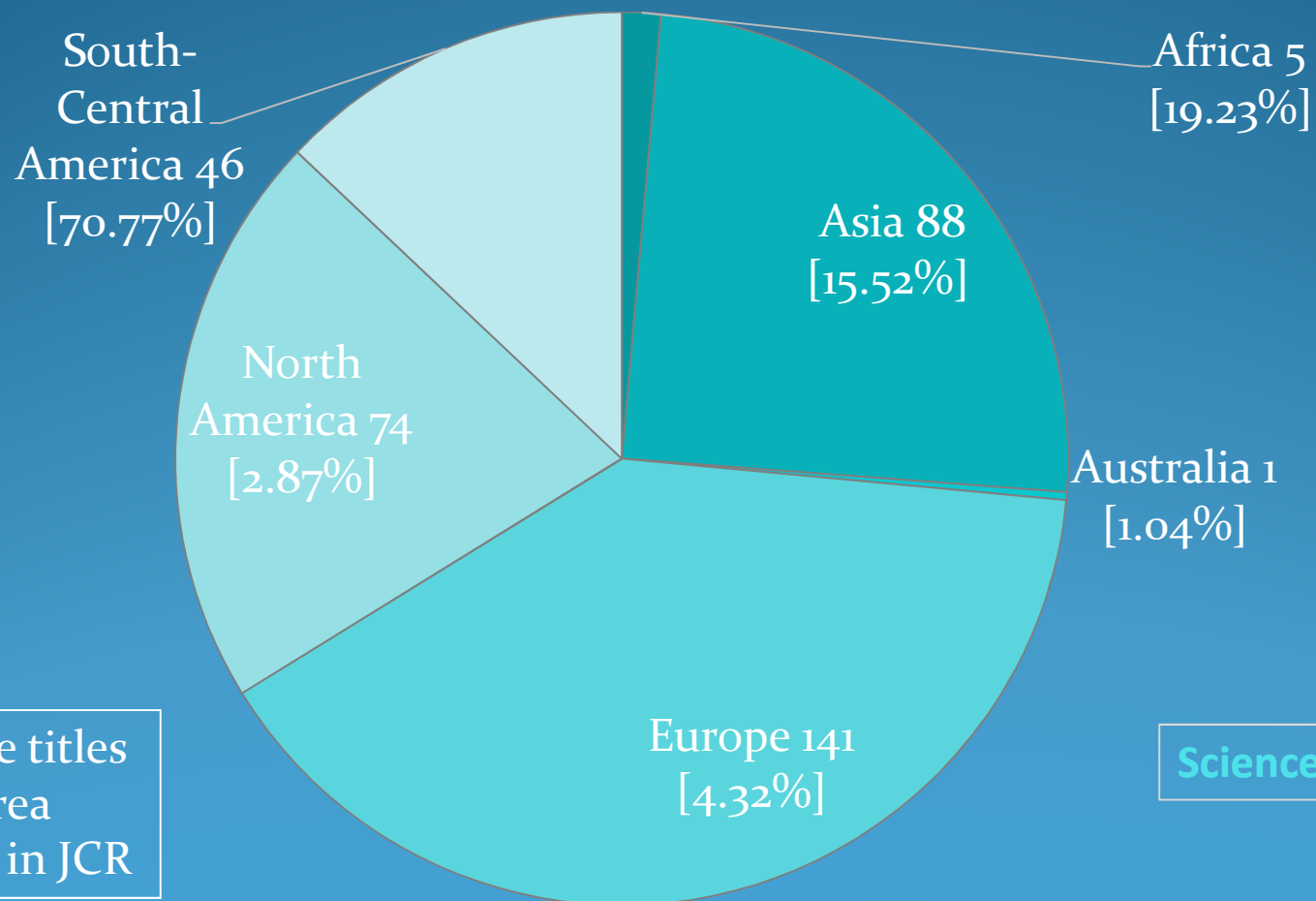
[Coverage is so low that claims, as to now, no more investigations than the simple trend in Impact Factor value]

Coverage in JCR [Science]

Year	Titles in JCR	Titles in DOAJ 31-12	OA titles with IF	OA titles with IF (%)
2003	5907	602	87	1.47%
2004	5968	1194	168	2.82%
2005	6088	1811	218	3.58%
2006	6164	2357	259	4.20%
2007	6417	2954	315	4.91%
2008	6598	3801	355	5.38%

[titles are not homogeneous because of inclusions/exclusions both in JCR and DOAJ]

Geographical distribution



% on the titles
of the area
covered in JCR

Science ed., 355 tit.

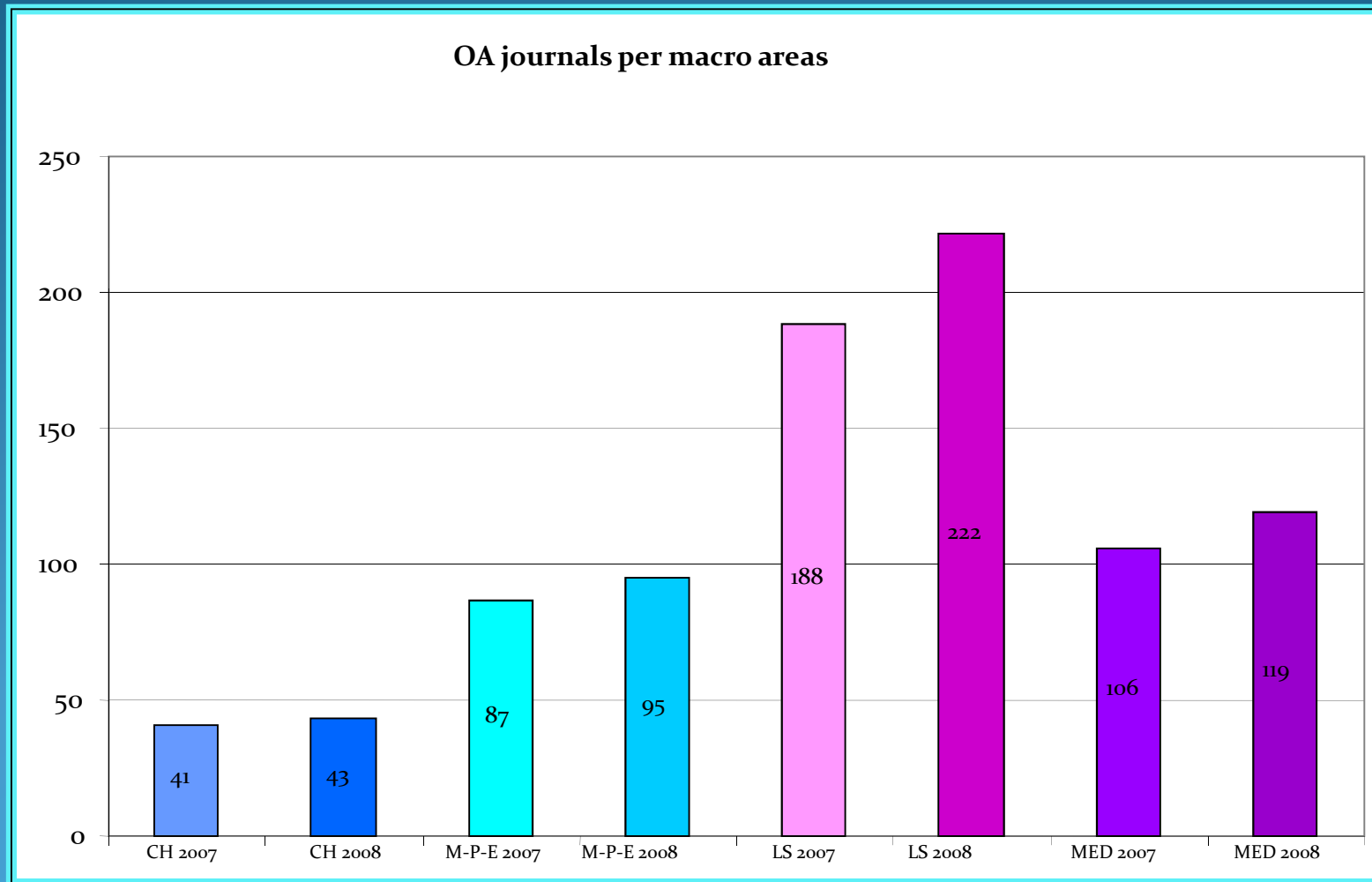
Disciplinary macro-areas

following McVeigh's method,
titles have been clustered in
4 disciplinary macro-areas
according to their JCR category:

- A – CHEMISTRY
- B - MATHEMATICS, PHYSICS, ENGINEERING
- C – LIFE SCIENCES
- D – MEDICINE

[titles with more than one category have been **uplicated**]

OA journals per macro area



Ranking

Impact Factor's values range
is widely distributed
among the categories

CA - A cancer journal for clinicians, first in its category
(Oncology) : IF = 74.575

Communications on pure and applied mathematics, first in
its category (Mathematics): IF= 3.806

Ranking

to obtain comparable data,
Impact Factor was converted
to percentile rank as follows:


$$P_n = \frac{100}{N} \left(n - \frac{1}{2} \right)$$

[P = percentile, N = number of items in a category, n = rank value of the title]

Ranking

percentile rank was first analyzed
for each title in its assigned
category within JCR

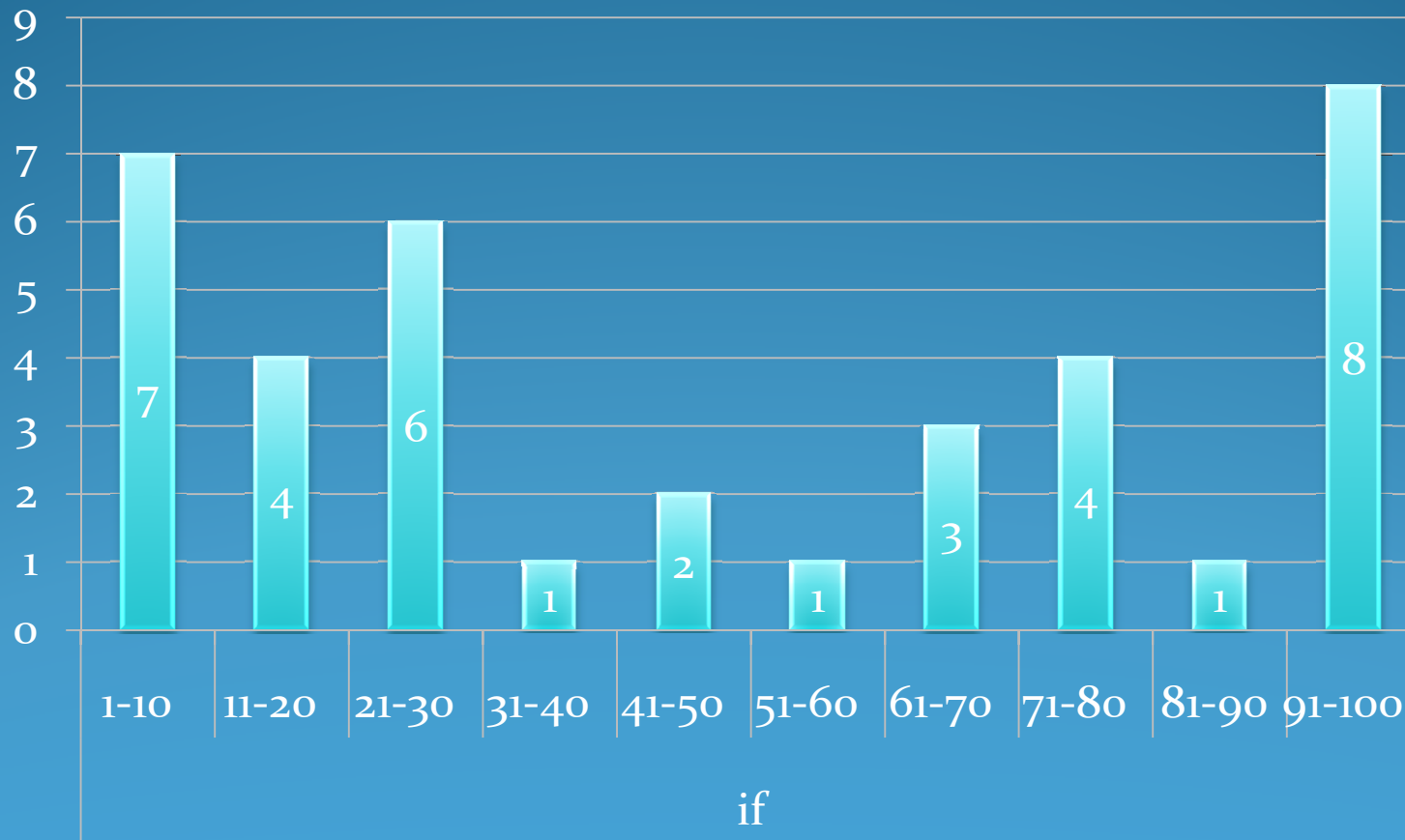
Chemistry [CH]: 43 titles in 15 categories
Math-Phys-Eng [M-P-E]: 95 titles in 32 categories
Life Sciences [LS]: 222 titles in 46 categories
Medicine [MED]: 119 titles in 31 categories

results were then aggregated by
disciplinary macro-area

In the tables: highest percentiles 0-10, lowest 90-100

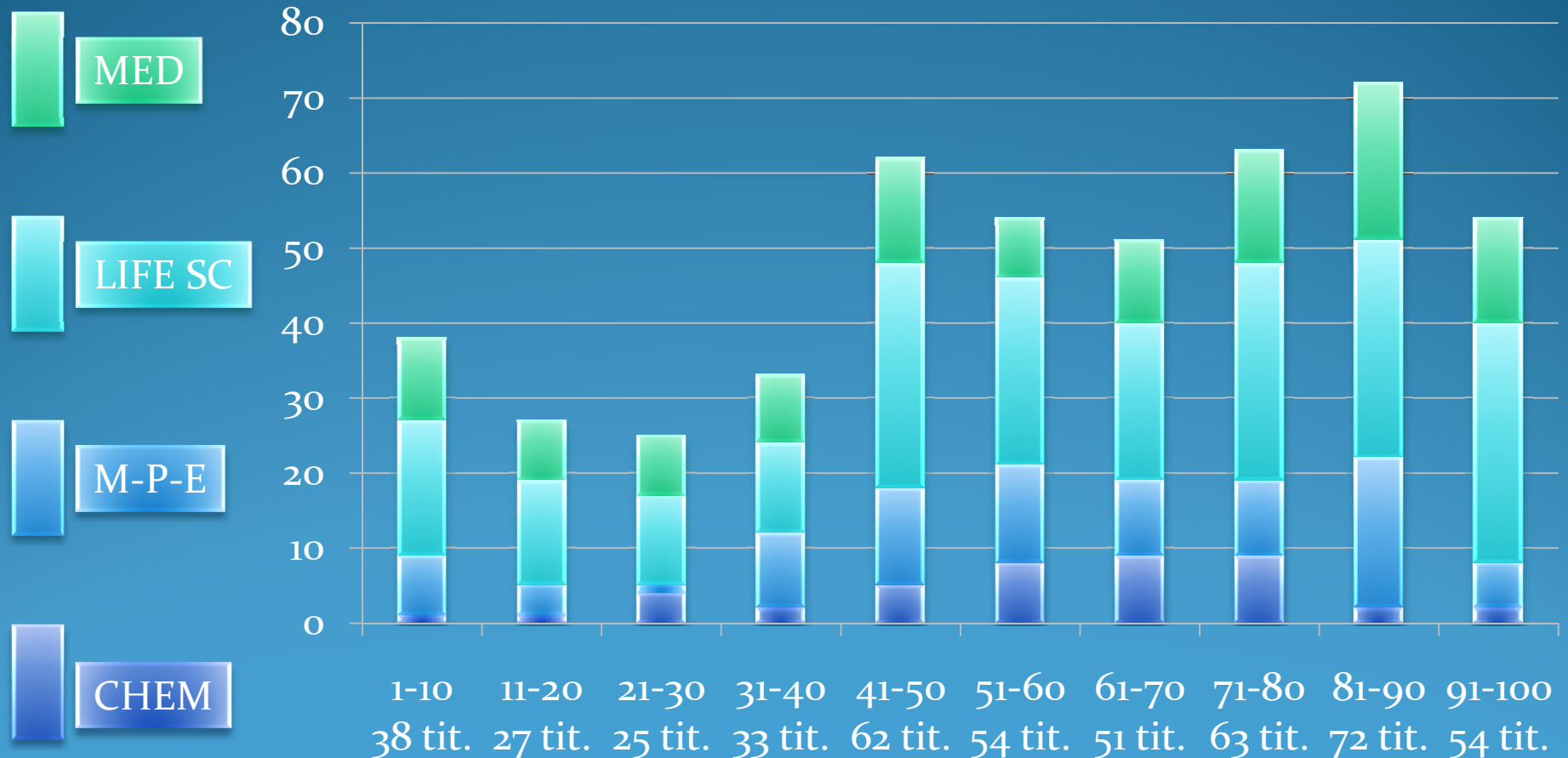
Impact Factor – JCR Social Sciences

30 tit. (37)	Highest 0-50 percentiles:	54.05% (20 out of 37)
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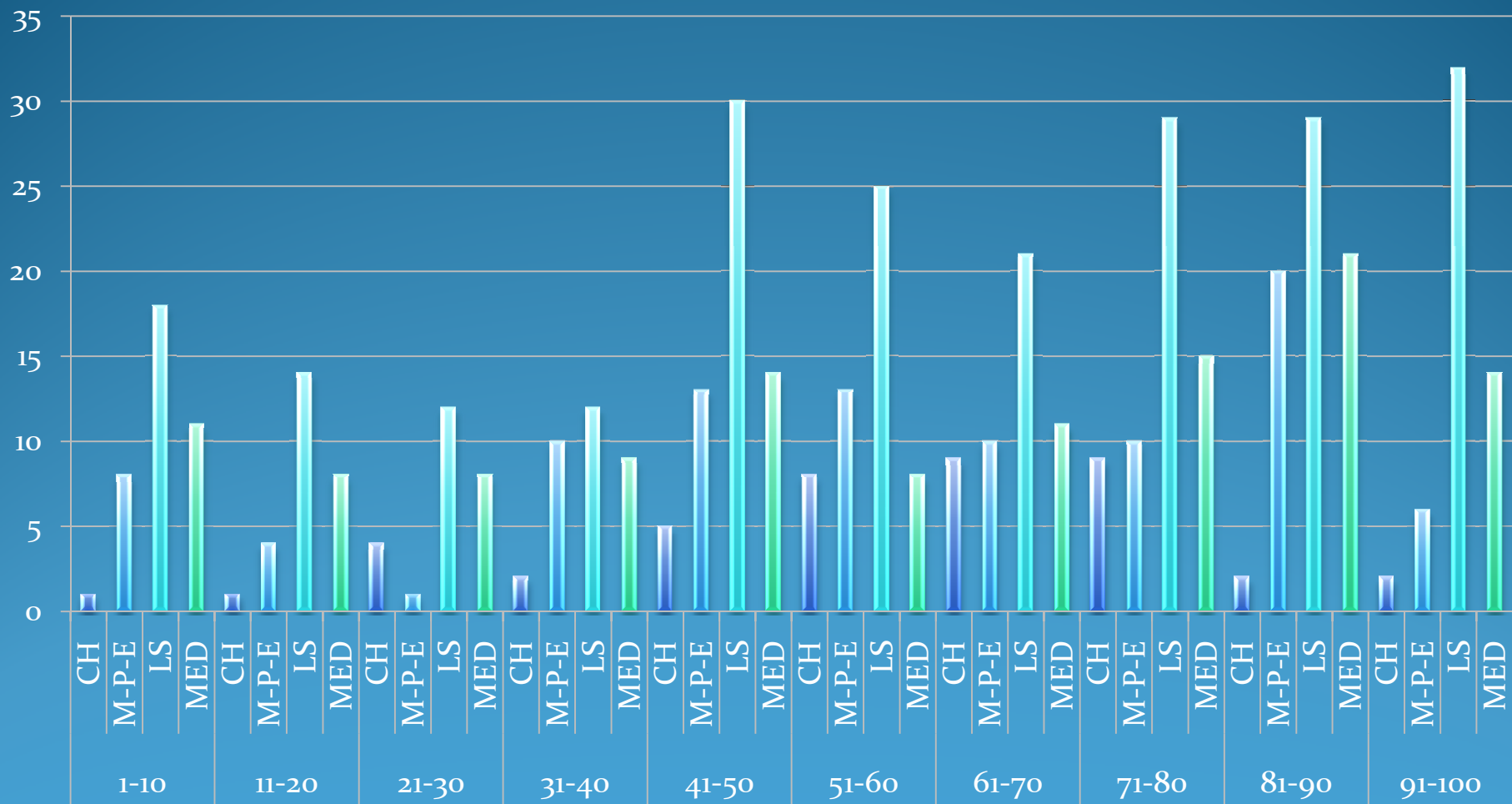


Impact Factor – JCR Sciences

2007	Top 0-50 perc.	37.68% (159/422)	+ 0,94%
2008	Top 0-50 perc.	38.62% (185/479)	

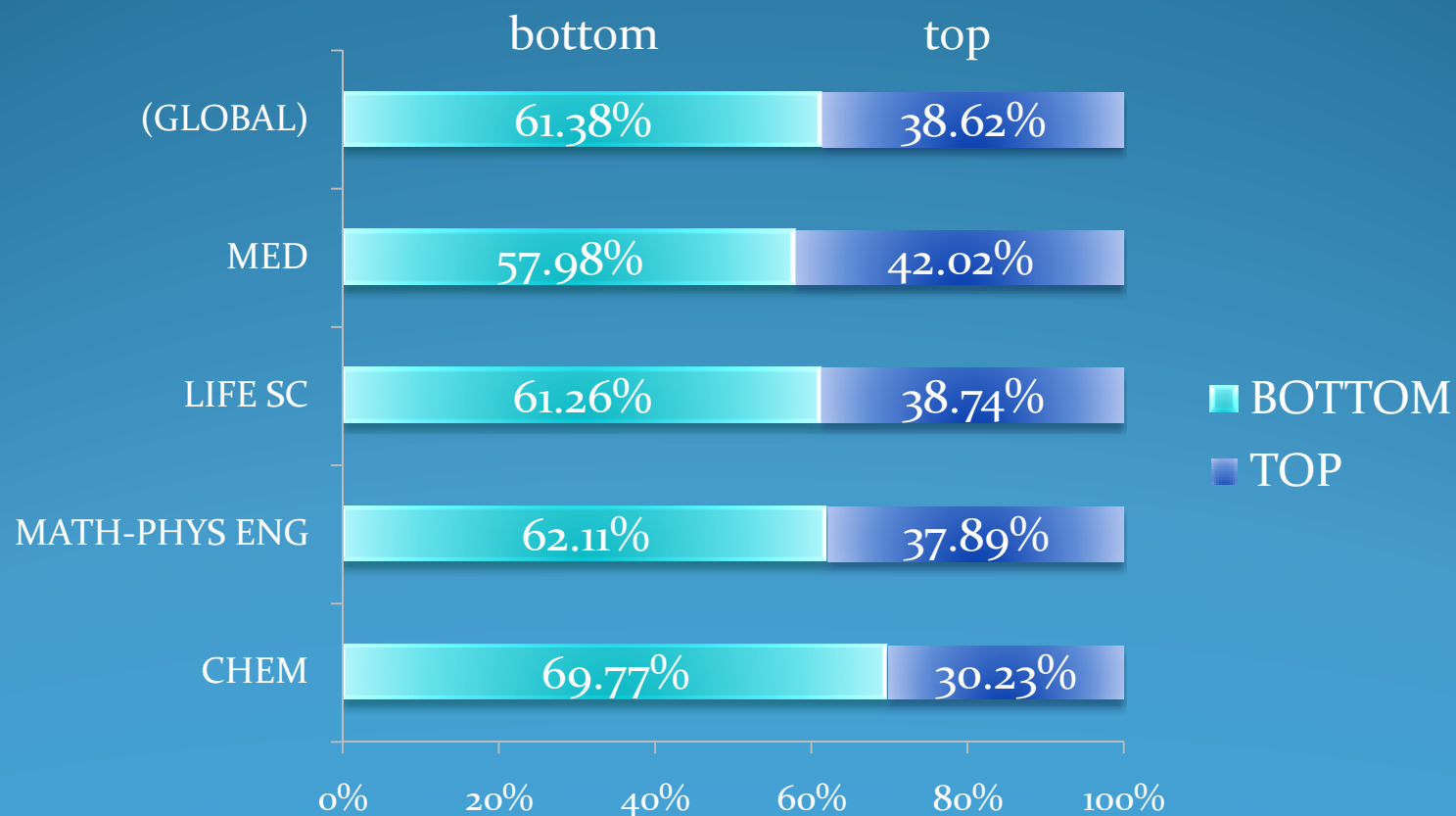


Impact Factor – JCR Sciences



Impact Factor – JCR Science

McVeigh 2004:  [Different datasets]



2009 Fall JCR revised edition

- 6620 titles (+22) [10 titles out of 22 are Open Access!]
- 365 titles (492 duplicates included)

Macro area	JCR 2008	Revised ed.	variation
Global (194 tit./492)	38.62%	39.43%	+ 0.81%
Chemistry	30.23%	31.11%	+ 0.88 %
Mathematic-Physics-Engineering	37.89%	39.58%	+ 1.69 %
Life Sciences	38.74%	39.04%	+ 0.30 %
Medicine	42.02%	43.09%	+ 1.07 %

...according to the purpose of this study, aimed at future assessments, only the official JCR 2008 (June 2009) edition has to be considered

Immediacy Index

...to test the potential

Open Access «Early Advantage»:

Immediacy Index

[reduction in percentiles with the same formula as IF]

Immediacy Index is...

«is the average number of times an article is cited in the year it is published»

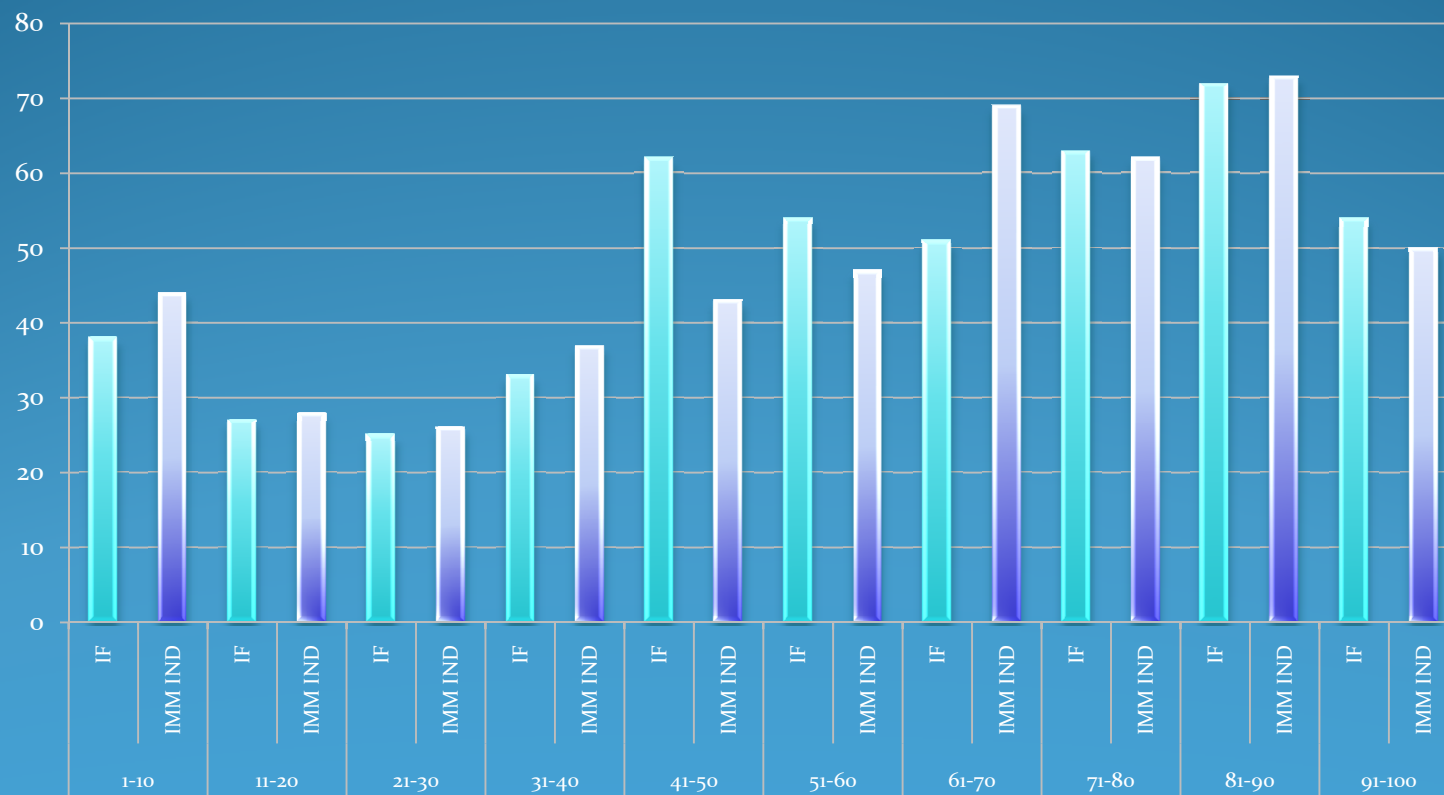
and it is calculated

«by dividing the number of citations to articles published in a given year by the number of articles published in that year»

[biases: frequently issued and big sized journals are more likely to be cited]

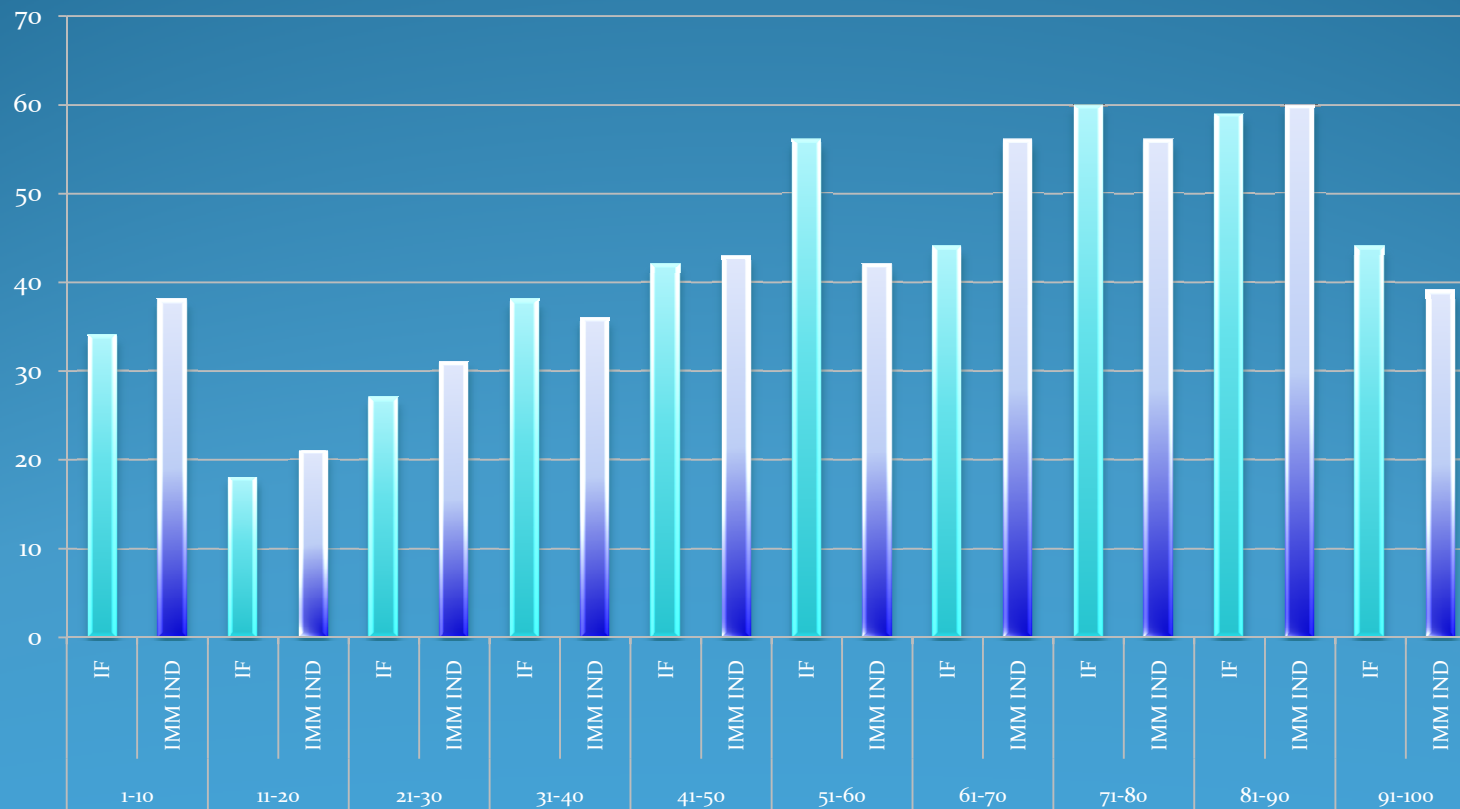
Impact Factor/Immediacy Index 2008

2008	0-50 perc.	titles	
Impact Factor	38.62%	185 out of 479	-1.46%
Immediacy Index	37.20%	178 out of 479	



Impact Factor/Immediacy Index 2007

2007	0-50 perc.	titles	
Impact Factor	37.68%	159 out of 422	+2.37%
Immediacy Index	40.20%	169 out of 422	



5-year Impact Factor

...criticisms against Impact Factor:
its time span

[2 years is a too narrow period to test the impact]:

a new indicator in JCR 2007,

5-year Impact Factor

[reduction in percentiles with the same formula as IF]

5-year Impact Factor is...

«the average number of times articles from the journal published in the past five years have been cited in the JCR year»

and it is calculated

«by dividing the number of citations in the JCR year by the total number of articles published in the five previous years»

[OA journals are young: **only 74%** with 5-year IF]

5-year Impact Factor

2008	0-50 perc.	titles	
Impact Factor	38.62%	185 out of 479	[+1,83%]
5-year Impact Factor	40.45%	144 out of 356 (74%)	



MED



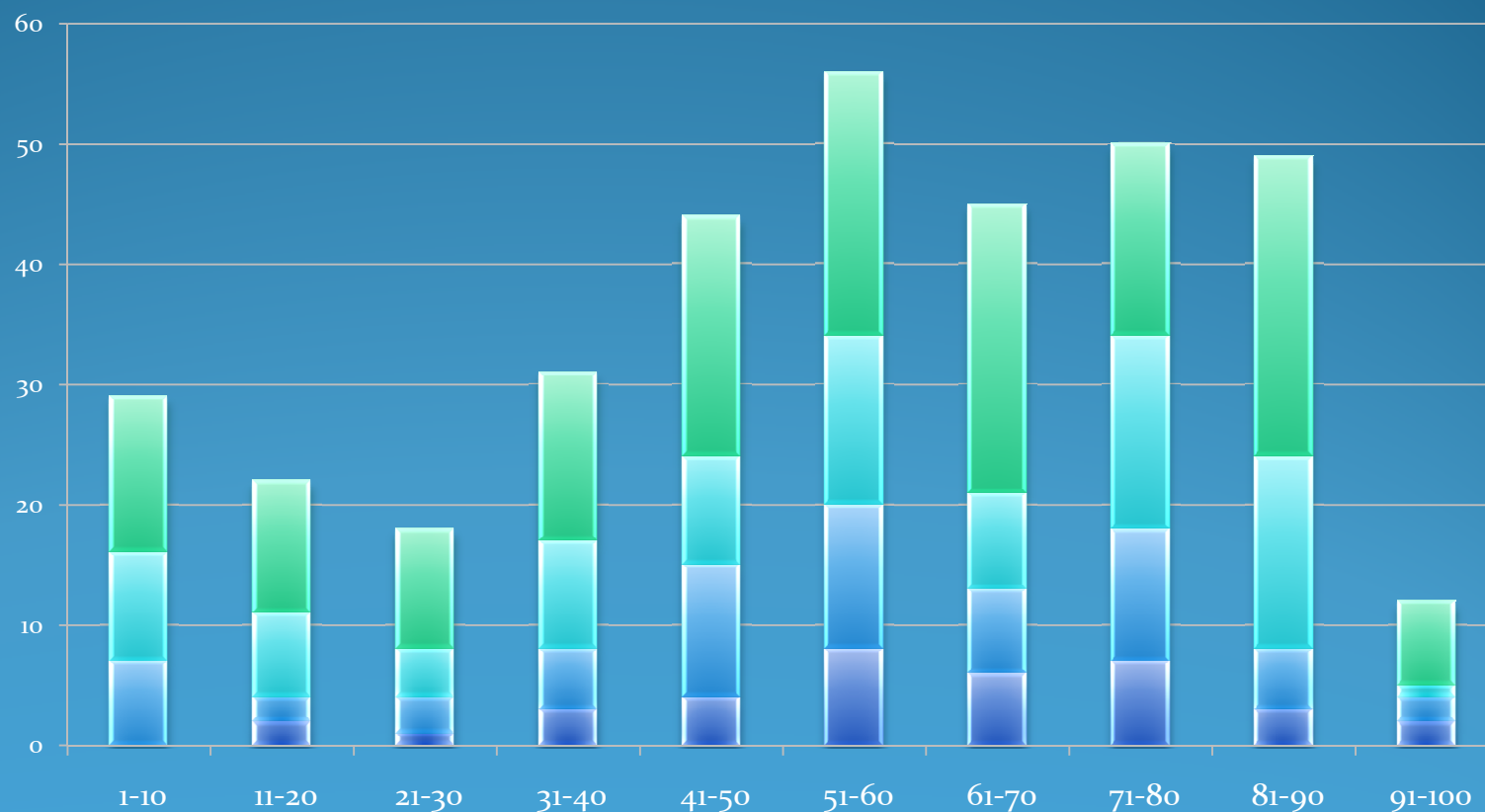
LIFE SC



M-P-E

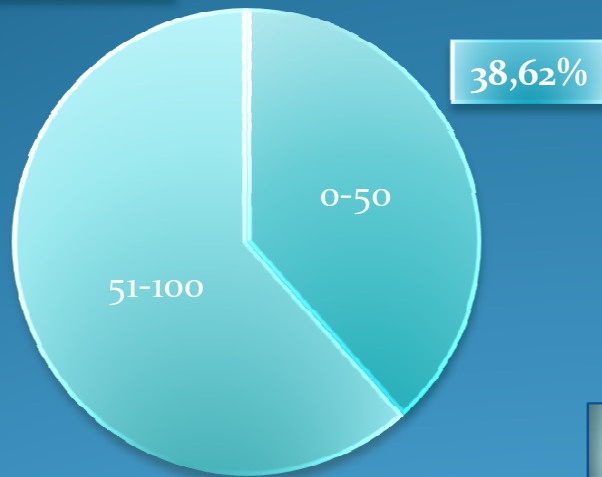


CHEM

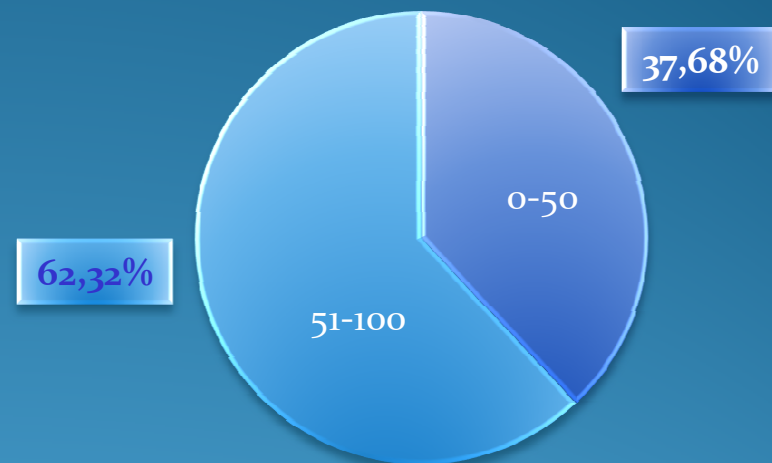


In a nutshell...

Impact Factor



Immediacy Index



Distribution top/bottom 50 percentiles

5-year Impact Factor



Something about age...

Percentile	CHEMISTRY	MATH-PYS-ENG	LIFE SCIENCES	MEDICINE
1	2001 1	4 1994 4	7 2003 11	5 1999 6
2	2001 1	2 1999 2	7 2001 7	3 2001 5
3	2 2000 2	1997 1	2 2001 10	3 2000 5
4	1 2003 1	5 1997 5	4 2000 8	4 2003 5
5	2 1990 3	6 1999 7	13 2000 17	6 2001 8
6	3 2000 5	5 1998 8	10 2000 15	4 2002 4
7	4 2000 5	5 1997 5	8 1999 13	5 2000 6
8	4 2002 5	4 1997 6	10 2000 19	7 1999 8
9	1 1998 1	9 1999 11	12 2000 17	6 2000 15
10	1 2004 1	3 2003 3	9 2001 23	6 2001 8

Median starting year of journals in each percentile/macro area
On the left, number of older titles; on the right equal/younger

Something about age...

...distribution is uneven, so that a direct causal relationship between age and **visibility and prestige** in terms of citations cannot be straightforwardly inferred

Striking examples...

- PLoS journals: first since their first tracking year
- *Atmospheric Chemistry and Physics* with its innovative peer-review system, always in the first positions

...they could be a proof that the pre-reputation period – i.e. the time span requested for a journal to establish in the scholarly publications market – could result shortened in an Open Access environment




But...

the great number
of young Open Access journals
ranking in the bottom
fifty percentiles (51-100)
could be a sign
of the **difficulty of competing**

The background is a solid blue gradient. At the top, there are several wavy, horizontal lines in shades of light blue and cyan, creating a sense of movement or a horizon line.

Finally...

...these results
are not outstanding,
but they represent
only the first step
of an ongoing work...

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...a fair discussion should require a
comparison with JCR 2010 data,
to set a trend which is expected
to be highly positive

In other words...

...data show that Open Access
journals **can compete**
with older actors...

...as Peter Suber puts it,
quality can keep pace
with prestige and reputation



...to be continued

with the new JCR 2010 edition [coming soon]...

Thank you!

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